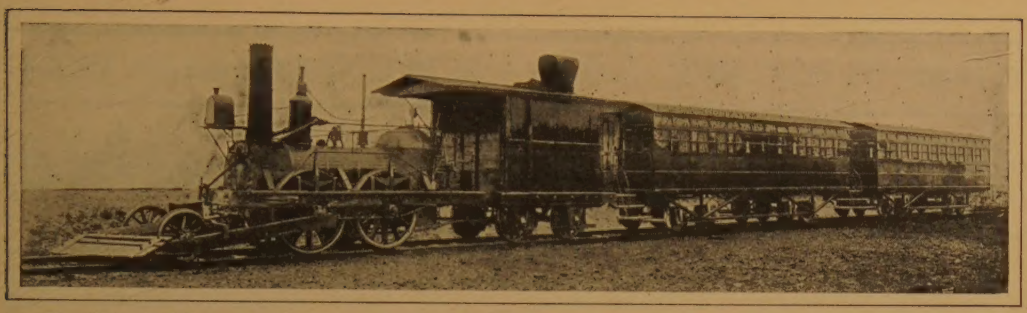

The "John Bull," operated in 1831 on the Pennsylvania Railroad, between Bordentown and South Amboy, N. J.

THE STORY OF THE AMERICAN RAILROAD

By ALBERT BUSHNELL HART

THE MENTOR · DEPARTMENT OF HISTORY · SERIAL NO. 87

MENTOR GRAVURES

HANGING BRIDGE, ROYAL GORGE, GRAND CANYON OF THE ARKANSAS, COLORADO · CROSSING THE SOUTHERN END OF GREAT SALT LAKE, UTAH · THE MODERN PERFECTED TRAIN · THROUGH THE ROYAL GORGE, GRAND CANYON OF THE ARKANSAS, COLORADO · THE HORSE-SHOE, DESCHUTES RIVER CANYON, OREGON · PAST AND PRESENT—THE "WILLIAM CROOKS" AND THE NEWEST TYPE LOCOMOTIVE.

PERHAPS the most wonderful thing about railroads is that civilized mankind should have been so long in inventing them. You may still see in Pompeii and Ostia the grooves in the stone pavements worn by wheels. Roman chariot drivers must have noticed how much easier the traction was in those stone ruts; and it would have been a short step to lay lines of grooved blocks on some of the magnificent Roman roads. Had the discovery been made then, and with it the perception that it is easier to groove wheels than pavements, there is little doubt that the Roman Empire could not have been overwhelmed by hordes of barbarians: the Romans would have been able to meet the invaders by a quick and cheap transfer of troops and supplies.

The railroad, when at last it appeared, was the contrivance of unknown English miners, who laid down little parallel rails, on which they pushed by hand coal cars furnished with flanged wheels. The next step was to continue the lines of rails from the pit's mouth to a nearby river, where the coal could be shipped on boats, the cars usually going down by gravity, to be drawn back empty by horses and mules. Such "tramways" were in use in England as early as 1676.

The idea spread to America, and in 1808 the skilful engineer Latrobe

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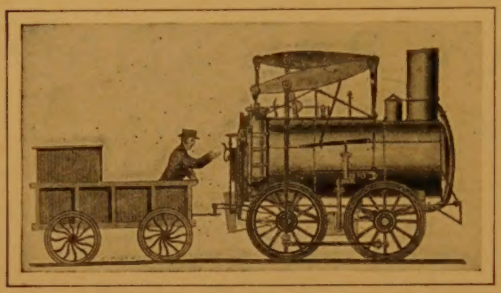
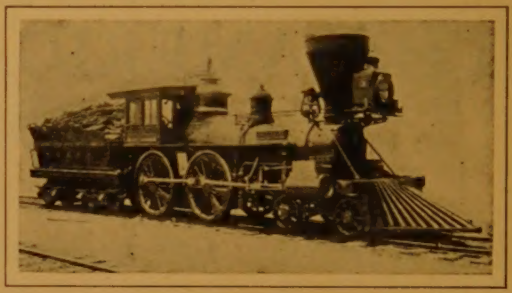
sent to Albert Gallatin, then secretary of the treasury, what appears to be the first American description of railroads, in which he says:

"A railroad consists of two pairs of parallel ways, one pair for going and the other for returning carriages; single roads, with occasional passing places, are applicable to some situations, and are of course less expensive. . . . The rails are of cast iron. . . . The rails need not be more than five-eighths of an inch average thickness, and they may be





THREE HISTORIC LOCOMOTIVES

On the left, the "Stourbridge Lion," the first locomotive run in America; at the right, "General," an engine with a Civil War career. It was stolen from the Confederates by the "Andrews Raiders;" below, the "De Witt Clinton," the first train operated in New York State, making a trip between Schenectady and Albany in 1831.

cast in lengths of five to six feet. . . . They must be laid at a distance of from three and a half to five feet . . . parallel to each other; the ends of every two forming rails, being let and pinned down into a piece of timber lying across the road. . . . The carriages which travel on these roads may be of various dimensions. . . . They have low cast iron wheels fast upon the axle, which turns round."

When Latrobe passes from description to prophecy he is not so successful. He goes on to say:

"The astonishing loads drawn upon railroads by single horses in England has induced many of our citizens to hope for their early application to the use of our country. I fear this hope is vain, excepting on a very small scale, and that chiefly in the coal country near Richmond; for it is evident that upon a railroad no other carriage but that which is expressly

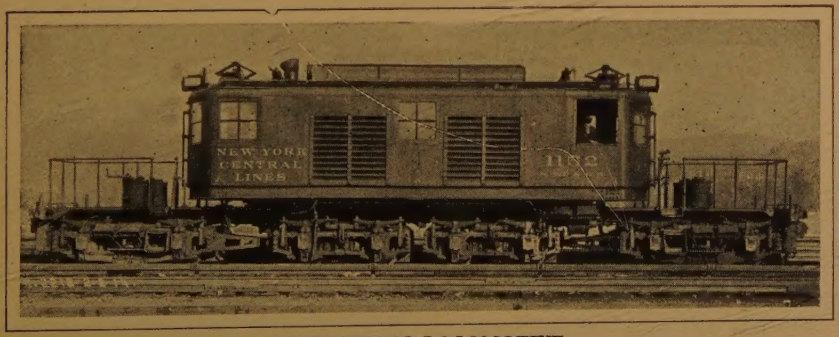
LOCOMOTIVE SPECIALLY DESIGNED FOR FREIGHT SERVICE
This is really two engines in one, and is designed for heavy hauls on steep grades

constructed for the purpose, can be employed; and that to render a railroad sufficiently saving of the expense of common carriage to justify the cost of its erection, there must be a very great demand for its use. But the sort of produce which is carried to our markets is collected from such scattered points, and comes by such a diversity of routes, that railroads are out of the question as to the carriage of common articles."

FIRST AMERICAN RAILROAD

Latrobe did not foresee the great future of transportation. He saw only animal motive power. His notion of a railroad was something like the two-foot tramway at Nikko, Japan, where a big and stupid bullock plows along, drawing a comical little car loaded with copper ingots. The success of railroads demanded a high-powered motor of some kind, and it was found in the steam engine. The earliest locomotive was built in England about 1810 and was very crude and clumsy; then in 1829 came a famous trial between several types of locomotives, in which George Stephenson's Rocket won, and made the amazing speed of over twenty miles an hour.

Meanwhile tramways were creeping into America. One was opened from a granite quarry at Quincy, Massachusetts, five miles down to tidewater, in 1826; the next year a coal tramway was built at Mauch Chunk, Pennsylvania. In the year 1828 the Baltimore & Ohio Railroad was chartered, and in 1830 was running from Baltimore to Ellicott Mills. Several English locomotives were brought over; but Peter Cooper



AN ELECTRIC LOCOMOTIVE
One of the latest-type electric locomotives in service on the New York Central

of New York built the Tom Thumb, the first American engine, which was bought by the Baltimore & Ohio. The tubes of the boiler are said to have been made from gun barrels. Then various improved types of locomotive were brought out by that railroad, and the manufacture progressed from the Davis "Grasshopper" through Winans' "Mud Digger" and "Camelback," the Hayes "Dutch Wagon," and types like the Mogul, the Mikado and others to the modern double Mallet engines.

When it was once proved that the locomotive was a success railroads began to spread throughout the country. The early roads were modeled on the turnpike companies; they ran a few miles from one city to another; there was no notion of long through lines. The first passenger cars were inconvenient imitations of stagecoaches. After a brief trial of the compartment system all the railroads built box cars with the middle aisle and two rows of seats. There was a time when the traveler westward from Albany by rail reached one journey's end and began another five times before he got to Buffalo. Many early lines were part railroad and part steamer, such as the route from Boston to New York, via Stonington on Long Island Sound; the original Erie Railroad from Piermont on the Hudson to Dunkirk; and the line from Washington, via Aquia Creek, to Richmond.

The early roads were built by stock companies which raised their money on the spot, and some of the first people to get in made fortunes out of the rises in value. On the other hand, many of the early railroads were bankrupted from one to three times before they got a fair start.

THE WIRELESS TELEPHONE IN OPERATION ON ONE OF THE TRAINS OF THE DELAWARE, LACKAWANNA & WESTERN RAILROAD

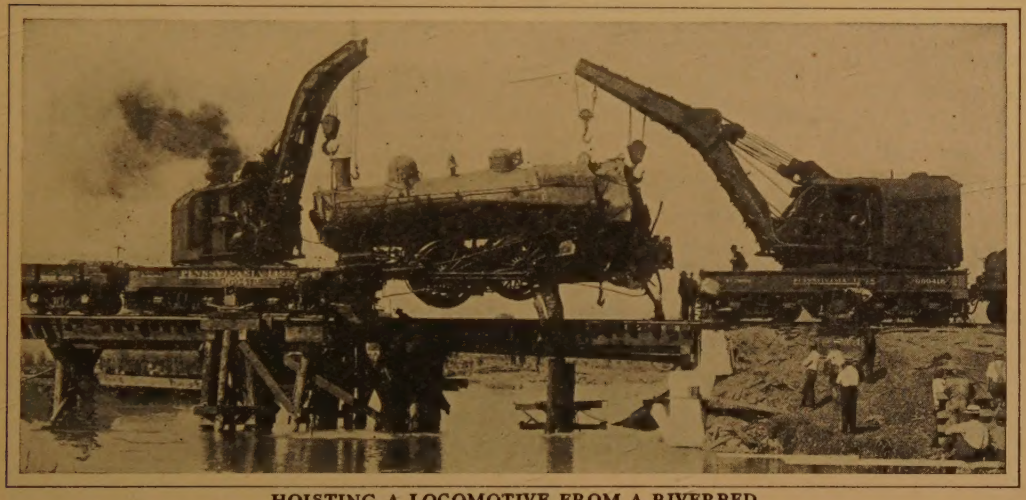
THE WIRELESS TELEGRAPH
Found effective during the winter blizzard of 1914, when telegraph poles were down

WIRELESS ANTENNÆ ON THE CARS

RAILROADS BEFORE THE WAR

In several European countries the railroads were, from the first, built and owned by the government, and that method was followed in several of the states of the Union. Michigan built half the main line from Detroit to Chicago. Massachusetts constructed the Hoosac Tunnel out of state funds, and about forty miles of connecting road. Illinois, Georgia, and North Carolina built short lines. None of these ventures prospered, and sooner or later all the state roads, with an exception or two, were sold, given, or leased to private companies.

The early railroads were ill built, slow, and inconvenient. The English traveler Murray tells how "the train danced up and down on the line, more



HOISTING A LOCOMOTIVE FROM A RIVERBED

During the floods that swept the state of Ohio in March, 1913, a locomotive of the Pennsylvania Railroad broke through a bridge at East Liberty. In August two wrecking cranes of the railroad hoisted the engine from its resting place on the bed of the river, and carried it off to the repair shops

than was pleasant, from the boggy nature of the ground." Trains might be expected, if "about on time," anywhere from half an hour ahead of time to an hour late. The stations were poor and dirty; grade crossings were numerous; accidents frequent, a favorite type being the ripping up of the bottom of the car by the loosening and bending of a "strap rail," the end of which stood up like a snag in a river.

RAILROAD CONSOLIDATION

It was only a matter of time till the country should wake up to the possibilities of long distance freight and passenger service. By 1835 the wealthy cotton men of South Carolina had built a road 137 miles long from Hamburg on the Savannah River to Charleston. All the coast cities saw the advantage of direct connection with the interior. For the benefit of New York City were built the lines from Albany to Buffalo, and the

direct Erie Railroad. For Philadelphia, a combination of railroads and canals was completed all the way to Pittsburg, in 1838; and soon after an all-rail route was opened. From Baltimore, the Baltimore & Ohio road eventually reached westward to Wheeling on the Ohio River. Thus before 1861 continuous lines of railroad stretched from the Atlantic Coast cities to Chicago and St. Louis, and from Chicago to Mobile and New Orleans. In all about 32,000 miles of railroad were completed.

THE COMPLETION OF THE UNION PACIFIC RAILROAD

THE DENVER & RIO GRANDE RAILROAD
Winding through the canyon of the Eagle River, Colorado

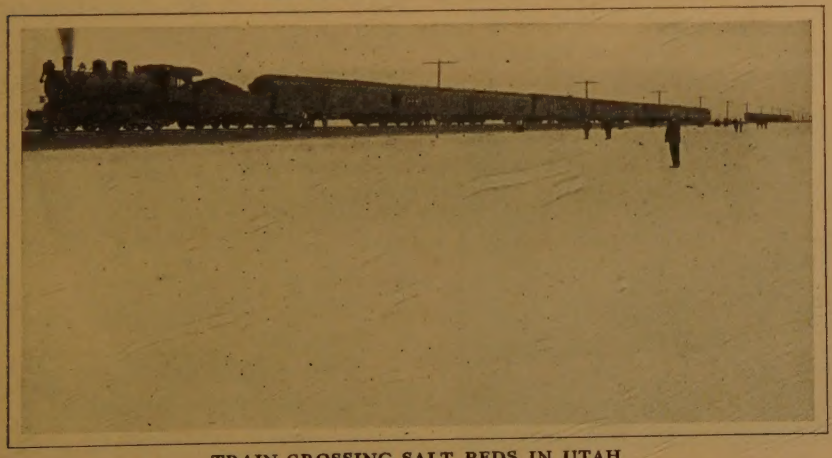
In the American Civil War railroads were, for the first time in the history of the world, used regularly for the carrying and supplying of armies; and during the struggle, Congress carried out the bold plan of fostering railroads across the continent. Here was an opportunity to try the possibilities of government ownership; but the country was then moving in the direction of consolidation under private ownership. The first "American railroad king" arose in the person of Cornelius Vanderbilt, who started out as a steamboat man, got interested in a transit system across the Isthmus of Nicaragua, and then turned his attention to railroads. He made a combination of the short lines, which together reached across New York, into the New York Central. Then he combined that road with the Hudson River, through a bridge across the Hudson at Albany, built in 1866, making a through all-rail line from New York City to Buffalo.

The second great combination was the Pennsylvania system, which bought roads from Pittsburg to St. Louis, Chicago, Cleveland, and Cincinnati, and then, about 1871, acquired a line from Philadelphia to New York. The Baltimore & Ohio and the Erie Railroads also extended to Cincinnati, St. Louis, and Chicago. In the South several great systems were gradually made up by building new lines, buying old roads, and completing missing links.

THROUGH BUSINESS

This growth and consolidation of railroads was needed to provide for the enormous increase in long distance freight and passenger traffic which arose after 1875. The grain of the Northwest and the grain and cattle of the Southwest found a market in Europe, and had to be transported to the seaboard. This gave a steady and profitable business to the trunk lines from Chicago and St. Louis to eastern seaports. In return the manufactures of New England and the Middle States and the coal of Pennsylvania and Ohio poured westward. Hence the railroads double tracked, built belt roads round the cities, and erected immense elevators and cattle yards. The invention of the steel rail by Bessemer and the building of steel bridges made it possible to carry heavier trains. These were drawn by heavier locomotives, which required still more ponderous rails and stronger bridges. Freight traffic grew till, on the Pennsylvania low-grade freight line between Harrisburg and New York, regular trains of fifty coal cars each sometimes ran as often as every ten minutes

MODERN STATION IN THE FAR WEST
The western entrance to Yellowstone Park on the Oregon Short Line Railroad



TRAIN CROSSING SALT BEDS IN UTAH
These beds on the Western Pacific Railway are about sixty miles long by eight miles wide. The salt is ninety per cent pure, and varies in depth from a few inches at the edges to twelve or fifteen inches toward the center. Wonderful mirage effects are seen in the vicinity

throughout the twenty-four hours.

Passenger travel grew in like manner. Hundreds of thousands of immigrants landed at the ports, and found their way west. The Far West was settled up by people from states farther east; the growth of the system of "drummers"—or, to speak more elegantly, "commercial travelers"—greatly increased travel. To accommodate this long-distance movement sleeping car lines grew up. At first railroads had their own cars; but where the route ran over several different roads it was more convenient to use cars of a general company. Woodruff, Wagner, and Pullman were all pioneers in Palace car manufacture, and gradually the Pullman Company absorbed the others. The traveler could find through cars from Boston or New York or Washington to almost any important point east of the Mississippi River and Chicago; and from Chicago and St. Louis and New Orleans through sleepers ran to Denver, Salt Lake City, and all Pacific ports. Then to save time, and make sure of meals, dining cars were introduced.

AN EARLY RAILROAD SCENE
At Little Falls, in the Valley of the Mohawk, New York State

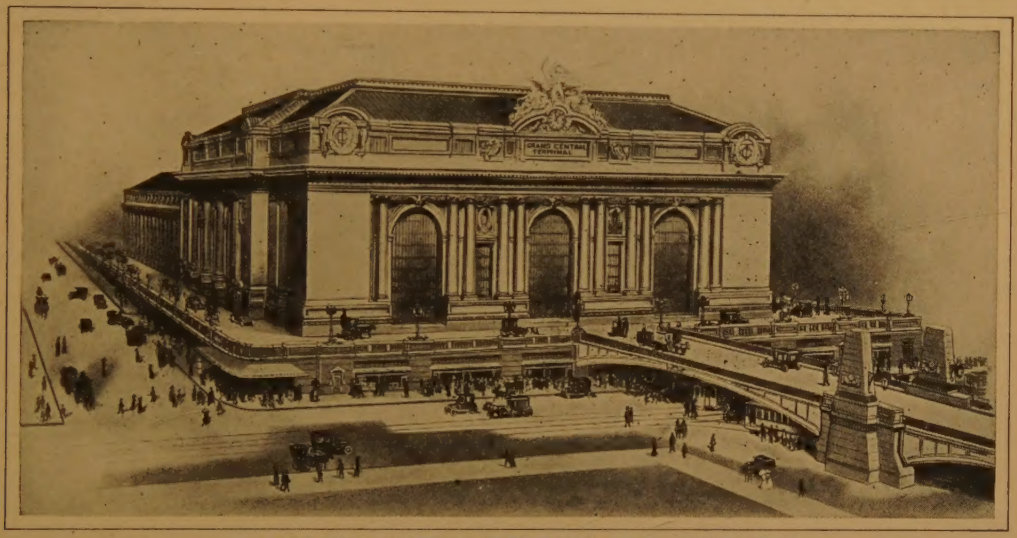
A TRAIN PASSING THE OLD TOMBS PRISON IN THE WINTER OF 1853
At this time the terminal of the New York & Harlem Railroad was back of the New York City Hall

OLD STATION OF THE HARLEM ROAD
At Twenty-sixth Street and Fourth Avenue, New York City. This is now part of the site on which Madison Square Garden is standing. The New Haven R. R. Station was at Twenty-seventh street

The result has been that in democratic America we have more classes of railroad travel than in any other country in the world. Over the same road, on the

same day, the following kinds of railroad passengers may be carried:

1. Pullman passengers, on a daily or weekly limited train, with extra fares for extra speeds.
2. Pullman passengers in drawing rooms or compartments on regular daily trains.
3. Pullman passengers in standard sleeping car berths.
4. Ordinary coach passengers (the so-called "first class") in day coaches.
5. Second-class passengers, traveling in tourist sleeping cars.
6. Second-class passengers in smoking cars.
7. Emigrants in cars somewhat poorer than the ordinary "smoker."



THE GRAND CENTRAL TERMINAL, NEW YORK CITY
Reproduced from the complete plan

TRIUMPHS OF ENGINEERING

In so broad a country as ours, with its lofty mountains, its deep gorges, its broad rivers, railroads are not built easily. It is a small matter to lay down a light, single-track line across nearly level prairies; but it took bold engineers to bridge the Ohio and Mississippi and Missouri, the Colorado and the Columbia; and still more to carry a railroad line, open both summer and winter, across the Continental Divide. Railroad bridges alone have absorbed at least a thousand million dollars, beginning with the arch of spliced timbers with its wooden roof, and the Howe truss bridge, and proceeding to the iron girder bridge, and to the far-flung arches of the Eads steel bridge at St. Louis and the enormous cantilever bridges over the Columbia, the St. Lawrence and other rivers. The late Edward Everett Hale used to say that he never crossed the Mississippi without putting up a prayer of thankfulness to the "Pontifex Maximus" of our times, the great bridge engineer George S. Morison.

Some mountains, such as the Hoosac Range in Massachusetts and the

THE PENNSYLVANIA STATION, NEW YORK CITY

Cascade Mountains in Washington, can be punctured by a tunnel; but American engineers have developed a wriggling, twisting, corkscrew mountain railroad, of which the most amazing is perhaps the line from Colorado Springs to Cripple Creek. That railroad from a distance looks like a child's plaything, winding in and out, scraping slopes, diving through ridges, circling precipices, ever steeply upward till you cross the divide at an elevation of about eleven thousand feet, under the shadow of Pike's Peak. Or you may take another wonderful line, winding and ever winding and heading to all points of the compass, which finally brings you over the ridge at the foot of mighty Mount Shasta. Or you may loop the loop on the new mountain section of the Canadian Pacific. In such places you are in the midst of a titanic struggle between nature and the railroad builder. Nature says, "These are my mountains, my gorges: no locomotive wheel shall invade my privacy!" Man replies, "This is my country, these are my rocks and rivers, and I will build where I please a road that will bind you down with rods of steel!"

The American may also rejoice in the splendid palaces which are going up all over the country to accommodate him and his children as they take and leave the trains. There was a time when Europe could reproach us with mean and tawdry stations, set down in the least inviting part of our cities. Till a short time ago the immense travel of Kansas City was accommodated in a barrack, which seemed to have blown off the bluff, and to have fallen into a mudhole. Today Kansas City has one of the biggest and most convenient stations in the world. Wherever you go—Portland, Detroit, Pittsburg, St. Louis, Philadelphia, Boston—you find like facilities. It was reserved for the capital city of the nation to build and occupy one of the most magnificent structures ever erected for the use of travelers. In grandeur, even that building is outdone by the great

stations of the Pennsylvania and the New York Central in New York City.

Truly the railroads are a part of the American commonwealth—not only because they live and move and have their being under the direction of state and national governments, but because they help to upbuild the nation. American railroads have cost twenty thousand million dollars, and employ over a million and a half men; they have made a great federal government possible, by bringing together commerce and people from the ends of the republic. The railroads are the arteries of civilized states, feeding the body politic, and nourishing the brain of the people. If the wheels should cease to go round for a single week, starvation would beset our greatest cities. The interests of the railroads and of the people are one.

THE PEQUEST FILL

On the New Jersey "Cut Off" of the Delaware, Lackawanna & Western Railroad. This "cut off" runs from Lake Hopatcong to Slateford and effects a saving of a little over eleven miles. The Pequest Fill is over three miles long; its height at the highest point is 110 feet

SUPPLEMENTARY READING

RAILROADS: THEIR ORIGIN AND PROBLEMS *By Charles Francis Adams*
Written in 1878 by the distinguished Massachusetts railroad commissioner and historian.

WHEN RAILROADS WERE YOUNG *By C. F. Carter*
An illustrated history of the pioneer days, and also of the building of certain great systems.

AMERICAN RAILWAY TRANSPORTATION *By Prof. E. R. Johnson*
A standard book, covering system, service, interrelations, and relations to the state.

THE AMERICAN RAILWAY, ITS CONSTRUCTION, DEVELOPMENT, MANAGEMENT, AND APPLIANCES (1888)
A popular account, with many illustrations.

THE STRATEGY OF GREAT RAILROADS *By F. H. Spearman*
A graphic account of the development of trunk lines and great systems.

ALL ABOUT RAILWAYS *By F. S. Hartnell*
A comprehensive description (chiefly of English railroads), written for boys; well illustrated.

STORY OF THE RAILROAD *By Cy Warman*
Popular account of the building of the lines west of the Missouri, by a practical train-man.

RAILROAD TRANSPORTATION: ITS HISTORY AND ITS LAWS *By Dr. A. T. Hadley*
Facts, principles and comparisons with the railroad policies and legislation in other nations, by a master of economics.

THE LAST AMERICAN FRONTIER *By F. L. Paxson*
Chapters on the building of the lines far west.

THE OPEN LETTER

THE OLD AND THE NEW

A comparison of the "De Witt Clinton," the first train operated in the State of New York in 1831, and a modern Pacific type steam locomotive. The length of the entire early train does not equal that of the locomotive and its tender

Thousands of people who travel in the suburbs of New Jersey have become familiar with the names of Harvey Springstead and Philip T. Nixon as they appear on two well-groomed locomotives in the car yards. Messrs. Springstead and Nixon have just reason to be proud of the privilege of placing their names on their engines. They belong to the Order of the Red Spot. The Red Spot is on the front of the engine, and it means long and creditable service. I presume that most people suppose that the name on the side of the engine cab, the bright shining bars, the brass star and the Red Spot on the front are adornments expressive merely of the engineer's taste for decoration. Few know that each one of these things is a distinctive mark of merit and part of a system of rewards.

★ ★ ★

The Order of the Red Spot applies to engineers alone. This Order is conferred as a reward for good operation of the locomotive, cleanliness and neatness, economy of fuel, low cost of running, avoidance of accidents, and general efficiency on the part of both the fireman and the engineer. The engineer is responsible for everything. It is up to him to keep the fireman in order, as well as the engine. The Red Spot is an honored order of the Erie Railroad—and the membership is large. The highest honor of all conferred upon locomotive engineers on this railroad is the privilege of attaching the engineer's name to the engine. It is granted on the same grounds as those of the Order of the Red Spot, but in addition a long and honorable service in the employ of the road is required.

There are not over a score of engineers who enjoy this privilege—not because more have not deserved it, but because the rule limits it to one engineer in each operating territory.

★ ★ ★

Conductors have no brass stars nor red spots, but they have gold bars on their sleeves for service and credit marks on their record for efficiency. These marks count in matters of advancement—and, too, occasionally in matters of discipline. Rewards for upkeep of the railroad track sections are adjusted on a cash basis. Each section of track has a foreman and several sections have one supervisor. Yearly there is an inspection of the various sections, the record being taken by a dynamometer car, which shows the gauge of the track, the ease of riding, and other qualities that enter into the service. The cleanliness of the track and the neatness and set of the ballast under the ties is also taken into consideration. The foreman of the best section in each supervisor's district gets a cash prize, while the best supervisor of all the districts is also rewarded in cash.

★ ★ ★

Old Omar said, "Take the cash and let the credit go"; but many a railroad man has come to realize that the cash is soon spent, while the credit is as long as life, and the Red Spot is a badge that can be shown with pride and satisfaction through all the working days. We do not know anything about the section foremen who have won cash prizes, but many of us know Harvey Springstead and Philip T. Nixon, and are glad to do them honor.

W. D. Moffat

EDITOR

HANGING BRIDGE, ROYAL GORGE, GRAND CANYON OF THE ARKANSAS, COLORADO

The Story of the American Railroad

JAMES WATT AND THE DISCOVERY OF STEAM

Monograph Number One in The Mentor Reading Course

THE story of the railroad may be said to begin with the discovery of steam, and the word "steam" recalls the story of James Watt, the Scottish boy, who watched the lid of his mother's teakettle move up and down and so discovered the expanding power of steam and its ability to perform work. Whatever we think of this story, it is a fact that we are indebted to James Watt and his mechanical genius for our powerful engines and our mighty locomotives.

James Watt was born in Scotland on January 19, 1736. His father lost his money when James was very young, and from then on the boy had to take care of himself. When he was nineteen he went to London and apprenticed himself to an instrument maker; but at the end of the year the hard work told on his delicate health and he had to go home for a rest. In 1757 Glasgow College gave him employment as the mathematical-instrument maker to the university.

At that time a man named Newcomen was experimenting with the steam engine. His engine was used only for pumping water in the drainage of mines. But it was so clumsy and wasteful that it was little used. In 1746 Watt went to work on a model of this engine, and he improved it so that it performed much better than Newcomen's. In January, 1769, he took out his first patent on the steam engine, and shortly afterward the inventor and a man named Matthew Boulton formed a partnership for making steam engines.

During the next ten years Watt worked hard and steadily. He took out other patents, and gradually improved the steam engine. He and his firm made a great deal of money. In 1800 he gave up his share in the business and went to Birmingham, where he lived quietly, working along other lines of mechanical invention. He died there on August 25, 1819.

Watt was married twice. For the greater part of his life he had a long struggle with poor health; but as he grew older he became stronger. He was not a man of business; for, as he wrote himself, "I would rather face a loaded cannon than settle an account or make a bargain; in short, I find myself out of my sphere when I have anything to do with mankind."

Watt made many friends during his life, and these friends speak of him as a man richly stored with various kinds of knowledge, and a great talker. Walter Scott, the English novelist, called him "an alert, kind, benevolent old man," and added, "his talents and fancy overflow on every subject, with his attention alive to everyone's question, his information at everyone's command."

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CROSSING THE SOUTHERN END OF GREAT SALT LAKE, UTAH

The Story of the American Railroad

GEORGE STEPHENSON AND THE FIRST RAILROAD

Monograph Number Two in The Mentor Reading Course

IT is hard to realize that the first railroad journey ever made took place less than a hundred years ago. It was on September 27, 1825, that the Stockton & Darlington, the first railroad over which passengers and goods were carried by locomotive, was opened.

Up to this time when people wanted to get anywhere they either rode in coaches or on horseback, or if they were too poor for these means of travel they walked. It was George Stephenson, a poor English boy, who was primarily responsible for the fact that we can now travel from New York to Denver in about the time that it used to take people to go from New York City to Washington, D. C.

Stephenson was born near Newcastle, England, on June 9, 1781. He was the second son of Robert Stephenson, a fireman on a stationary engine in a coal mine. As a boy George was first employed as a cowherd, and later he drove the jin horse at the colliery. He never went to school. He liked the engines at the colliery, and used to make little clay models of them. When he was only fourteen he became assistant fireman to his father, and three years later was appointed to attend the pumping engine.

He was so interested in his work that he wanted to know all about it. But he soon saw that without education he could learn very little; so he set to work to learn to read. When he was eighteen he went to night school.

Later on Stephenson took up watch and clock making, and in 1812 became engineer on a stationary engine at a salary of $500 a year, which was a great deal at that time. It was there that he invented a safety lamp for miners.

In the meanwhile Stephenson had fallen in love and married Fannie Henderson, who died in 1806, leaving a son, Robert.

In 1813 Stephenson was authorized by the company that owned the Kellingworth Colliery to build a "traveling engine to run between the colliery and the shipping port nine miles away." The inventor named this engine "My Lord," and it had a successful trial on July 25, 1814. A company of men had planned a railroad called the Stockton & Darlington Railway, and they figured on using horses to pull their wagons on rails. But Stephenson persuaded them to try one of his engines instead, and on September 27, 1825, this railroad was opened successfully.

A prize of $2,500 was offered by the Liverpool & Manchester Railway for an engine, and in October, 1829, it was awarded to Stephenson for his locomotive the Rocket. In September of the following year the railway was formally opened, and the eight engines that were used had been made by Stephenson's company.

From that time on Stephenson grew more and more famous and wealthy. His engines were used not only all over England, but also all over Europe. He spent the last year or two of his life in farming, and died at Chesterfield, England, on August 12, 1848.

Stephenson married three times. Although he grew immensely rich, he never forgot that he had been poor, and his purse was ever open to those less fortunate.

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A MODERN PERFECTED TRAIN

The Story of the American Railroad

PETER COOPER, MATTHIAS BALDWIN, AND THE FIRST AMERICAN RAILROADS

Monograph Number Three in The Mentor Reading Course

RAILROAD enterprise in America began almost the same time as in England. Although most of the early locomotives used in the United States came from England, Peter Cooper, the famous manufacturer and philanthropist, was one of the first locomotive constructors, and made a small experimental model which attracted much attention.

Peter Cooper was born in New York City on February 12, 1791. Both his grandfather and his father served in the Revolution. He went to school hardly at all: he worked instead with his father at hat making in New York, in a brewery at Peekskill, in a brick factory at Catskill, and again in a brewery at Newburgh.

When he was seventeen he was apprenticed to a coachmaker in New York City. Four years later he was employed in a factory that made machines for cutting cloth, and when he was only twenty-four he entered into this business for himself. When times were dull, after the war of 1812, he turned his shop into a furniture factory; but not being satisfied he became a grocer at the site of the present Bible House, opposite Cooper Union, in New York City.

It was in 1828 that he built the Canton Iron Works in Baltimore, and laid the foundation of his great fortune. Two years later he designed and built a steam locomotive that was used on the Baltimore & Ohio Railroad. This engine was called the Tom Thumb.

Then in the following years Cooper engaged in many enterprises. He was actively interested in laying the first Atlantic cable, and was president of the company that controlled more than half the telegraph lines of the United States.

He is probably best known, however, as the founder of Cooper Union in New York City,—a free educational institution "devoted to the advancement of science and art in their application to the useful purposes of life." Cooper died in New York City on April 4, 1883.

The Stourbridge Lion, built in England, was really the first practical steam engine to be run in America. Its first trip took place at Honesdale, Pa., on August 9, 1829. Another early American-built locomotive, the Best Friend, was built at the West Point foundry, New York. It managed often to get up a speed of as much as twenty-one miles an hour. It blew up after a few months' use, due to the fact that the engineer, annoyed by the sound of the escaping steam, fastened down the safety valve.

Matthias W. Baldwin was founder of the famous Baldwin Locomotive Works in Philadelphia. He built his first engine, Old Ironsides, for the Philadelphia, Germantown & Norristown Railroad in 1832. It was modeled after Stephenson's Planet. His second engine, called the E. L. Miller, in 1834 led the way in a characteristic which American locomotives retain to this day; that is, the front part was supported on a four-wheel turning truck.

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THROUGH THE ROYAL GORGE. GRAND CANYON OF THE ARKANSAS. COLORADO

The Story of the American Railroad

SIR HENRY BESSEMER AND THE STEEL RAIL

Monograph Number Four in The Mentor Reading Course

IT is largely due to Sir Henry Bessemer that we have safe, speedy, and cheap travel on railroads today. A railroad train must have rails to travel upon, and before Bessemer's time the only suitable material for rails was iron.

Bessemer's great invention was a converter for changing pig iron into steel. Molten cast iron is put into the converter, a huge steel pot having a fire bricklining, and hung on pivots. Air is forced in, and, mixing with the mass, oxidizes the carbon and silicon in the iron and thus furnishes additional heat, economizing fuel. Steel suitable for building material, bridges, and rails is produced at a cost far below that obtained by any other process.

Sir Henry Bessemer was born on January 19, 1813, in Hertfordshire, England. His attention was drawn to the problem of steel manufacture when he was trying to improve the construction of artillery. He decided that if better guns were to be made, better metal must be obtained. When he announced his discovery of the converter in 1856 immediate notice was taken of it; although many people doubted the success of the methods. Several ironmasters attempted to put the process to practical trial, and they failed to get good results.

Bessemer, however, undiscouraged by these failures, continued his experiments. At the end of two years, having improved his process, he tried to persuade the makers to use it. But no one would do this, and he was forced to erect his own steel works in Sheffield. Gradually he built up his business, and finally, due to the fact that he could give the same quality of steel at a price $100 a ton less than other people could sell it for, he proved that his method was the only one worthy of use. He was then besieged by offers to use his process, and in a short time was receiving royalties which amounted to considerably over $5,000,000 a year. In 1879 he was admitted as a fellow in the Royal Society, and was also knighted by the government.

Bessemer invented a number of other things; but one of his failures was most interesting to those who have ever suffered from seasickness. This was a ship that had the saloon so mounted as to be free to swing one way or another, in this way always to be maintained steady and level no matter how rough the sea. A boat, which was called the Bessemer, was built on this plan in 1875. It was tried across the English Channel; but it was found that the mechanism would not work, and the idea was abandoned.

Bessemer died in London on March 15, 1898

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THE HORSESHOE, DESCHUTES RIVER CANYON, OREGON

GEORGE WESTINGHOUSE AND THE AIRBRAKE

Monograph Number Five in The Mentor Reading Course

BEFORE the time of the airbrake all railroad trains had to be stopped by handbrakes worked by brakemen on individual cars. Sometimes there weren't enough brakemen to operate all the brakes, and sometimes the brakes weren't applied at the right time. Then there was either a serious collision or the passengers got a terrible jolt.

The power brake field was worked by numerous inventors before the days of Westinghouse. Heavy coiled springs on each car, to be released by the engineer on the locomotive, and a chain extending the length of the train and to be wound upon the engine, predominated among the schemes tried. But Westinghouse, in 1869, with his well-designed compressed air apparatus, at once distanced all competitors.

To put it briefly, the airbrake consists of compressed air working on pistons that press the brake-shoes to the wheels of the cars throughout the train. The flow of this compressed air is controlled by the engineer, and it operates almost instant on all the cars.

George Westinghouse was born on October 6, 1846, at Central Bridge, Schoharie County, New York. His father was a builder; but in 1856 the family removed to Schenectady, where Westinghouse, Sr., became superintendent of the Schenectady Agricultural Works. It was in the shops of these works that young George found his vocation. Before he was fifteen years old he had modeled and built a small steam engine.

He received his education in public and high schools, and later went to Union College, where he remained two years. When the Civil War broke out he enlisted; but as soon as it was over he returned to Schenectady and went on with his work. He was of an inventive turn of mind, and began trying to improve upon many mechanical devices. One of his first important inventions was a "frog" for rerailing cars that had run off the track.

He married in 1867. A year later, when he was at Pittsburg making his frogs, he was reading a newspaper one day when he came across an account of the use of compressed air in piercing the Mont Cenis tunnel. For sometime he had been working on the subject of railroad brakes, and in a flash the idea came to him of using compressed air for this purpose. His friends ridiculed the idea; but nevertheless Westinghouse persevered, and had the satisfaction of seeing his invention successfully tried in a short time.

In the early '90's petroleum was discovered in the fields near Pittsburg. Westinghouse was greatly interested. He thought that near his own home oil might perhaps be found. In December, 1883, he began to drill, and at a depth of 1,560 feet he found—not the oil for which he was looking, but gas. Quick to realize the possibilities, he devised a complete system for controlling this gas and conveying it through pipe lines for long distances. In this way he made it practical for Pittsburg to use gas as fuel in homes, mills, and factories.

Westinghouse was always interested in electricity for the purpose of lighting and power. He built the first ten great dynamos for Niagara Falls, the dynamos for the elevated and subway roads in New York, and for the Metropolitan Railway in London. He also took a leading part in developing gas engines and in adapting steam turbines to electric driving. He died on March 12, 1914.

During his life Westinghouse made his home at Pittsburg. He received the decoration of the Legion of Honor of France, of the Royal Crown of Italy, and of Leopold of Belgium. He was also a member of many scientific societies.

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PAST AND PRESENT—THE "WILLIAM CROOKS" AND THE MODERN TYPE LOCOMOTIVE

The Story of the American Railroad

GEORGE M. PULLMAN AND THE LUXURY OF RAILROAD TRAVEL

Monograph Number Six in The Mentor Reading Course

N the early days of railroads lines were not very long, and consequently people did not travel over great distances. Later on, as the United States developed, railroads covered more and more territory, and people began to make longer journeys by rail. When on one of these journeys people did not step into the aisle at night as they do now and let the porter make up their berth so that they might have a comfortable rest while speeding through the dark: they merely huddled up into a corner of the seat, rested their head upon their hand, and tried to snatch as much sleep as they could, despite the uncomfortable bumping of the car. Now one can have a good bed and obtain nearly as much rest as in one's own home. And the man responsible for this most important change in railroad travel was George Mortimer Pullman. He was the real designer of the modern parlor car.

Pullman was born in Chautauqua County, New York, on March 3, 1831. When he was only fourteen years old he entered the employ of a country merchant. Three years later he went to Albion, New York, where he joined his elder brother in the manufacture of cabinets. At twenty-two he undertook a contract for moving warehouses and other buildings along the banks of the Erie Canal, which was at that time being widened by the state government.

In 1859 Pullman went to Chicago and took up the novel business of building blocks of brick and stone buildings. Then his attention was drawn to the problem of sleeping cars, which was confronting railroad men of the country. He took two old day coaches of the Chicago & Alton Railway and transformed them into sleeping cars. These immediately found favor with travelers, and there was a demand for more of the same type. In 1863 he built his first Pullman palace car, the forerunner of all modern luxurious sleeping cars. He named this car the Pioneer, and from that day on each car put out by the Pullman Company has had its individual name. The Pioneer cost $18,000 to build.

Pullman continued developing the sleeping car. In 1887 he introduced the car vestibule, which virtually makes one long car out of the entire train. These were first used on the Pennsylvania Railroad.

Pullman organized the Pullman Palace Car Company, and in 1880 founded the town of Pullman near Chicago. The company attempted to make it a model town. Even the public works were the property of the company, and were managed as a business investment. But popular discontent with existing civic conditions led to the annexation of Pullman to Chicago in 1889.

Pullman organized and was later president of the company that built the Metropolitan Elevated Railways in New York City. He died on October 19, 1897.

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